CLAIMS

1. Aspherical microlens arrays comprising:

a base: and

a plurality of aspherical microlenses arranged on the base.

2. The arrays of claim 1, wherein the microlenses have respectively different curvature radiuses and conic coefficients along two orthogonal axes on the base perpendicular to an optical axis.

3. The arrays of claim 2, wherein the microlens is formed in a prolate ellipse shape of which conic coefficient takes the range between –1 and 0 (zero) along one axis of the two orthogonal axes, while the microlens is formed in an oblate spheroid shape of which conic coefficient is more than 0 (zero) along another axis orthogonal to the one axis.

4. The arrays of claim 1, wherein the microlenses preferably arranged on the base to have a hundred percent of packing fraction.

5. The arrays of claim 1, wherein the footprint of the microlens has a triangular shape.

6. The arrays of claim 1, wherein the footprint of the microlens has a square shape.

7. The arrays of claim 1, wherein the footprint of the microlens has a hexagonal shape.

8. The arrays of claim 1, wherein the base is formed of a transparent resin.

9. The arrays of claim 1, wherein the base is formed of glass.

10. The arrays of claim 1, wherein the microlenses are arranged as a honeycomb shape.

11. The arrays of claim 1, wherein the microlens has a size of several microns to hundreds of microns.

12. A method for fabricating aspherical microlens arrays, the method comprising:

a first step of fabricating a first mold having spherical groove arrays with different curvature radiuses, respectively, along two orthogonal axes on one surface;

a second step of fabricating spherical microlens arrays capable of an elastic deformation using the first mold;

a third step of fabricating aspherical microlens arrays having different curvature radiuses and conic coefficients, respectively, along two orthogonal

axes on one surface of the microlens arrays by providing elongated force to the elastically-deformable spherical microlens arrays;

a fourth step of fabricating a second mold having aspherical groove arrays, namely, a reversed phase of the aspherical microlens arrays on one surface thereof; and

a fifth step of reproducing the aspherical microlens arrays using the second mold.

13. The method of claim 12, wherein the first step includes the steps of:

fabricating spherical microlens arrays on which spherical microlenses having different curvature radiuses, respectively, along two orthogonal axes on a certain plane surface of a base are arranged;

fabricating the first mold having the spherical groove arrays which is the reversed phase of the spherical microlens arrays, by plating a metal on the surface of the base on which the spherical microlenses have been formed; and

releasing or removing the spherical microlens arrays from the first mold.

14. The method of claim 13, wherein the spherical microlens is formed by a reflow technology.

15. The method of claim 13, wherein the metal to be plated is

nickel.

16. The method of claim 12, wherein the second step includes the steps of:

forming an elastically-deformable resin layer on one surface of the elastically-deformable base;

compressing the resin layer on one surface of the first mold at which the spherical groove arrays have formed and thus forming spherical microlenses on the resin layer;

hardening the resin layer on which the spherical microlenses have been formed; and

releasing the spherical microlens arrays from the first mold.

17. The method of claim 16, wherein the resin layer is hardened through an ultraviolet applying or a heating.

18. The method of claim 12, wherein in the third step, an elongated strain is generated in a certain axial direction of the microlens to which the elongated force has been provided, and compression force is provided to an axial direction orthogonal to the certain axial direction, thereby simultaneously generating a constrictional strain.

19. The method of claim 12, wherein the fourth step includes the steps of:

plating a metal on the aspherical microlens arrays fabricated through the third step and accordingly fabricating a second mold which a reversed phase of the aspherical microlenses is transcribed on one surface thereof; and

releasing the aspherical microlens arrays from the second mold.

20. The method of claim 19, wherein the metal to be plated is nickel.

21. The method of claim 12, wherein the fifth step includes the steps of:

forming a molding layer on a certain surface of a base;

compressing the molding layer on a certain surface of the second mold on which the aspherical groove arrays has been formed and accordingly forming aspherical microlenses on the molding layer;

hardening the molding layer on which the aspherical microlenses have formed; and

releasing the aspherical microlens arrays from the second mold.

22. The method of claim 21, wherein the base is formed of transparent resin or glass.

23. The method of claim 21, wherein the molding layer is transparent resin or glass.

24. The method of claim 21, wherein the molding layer is hardened through an ultraviolet applying or a heating.

25. A projection screen comprising:

an aspherical microlens arrays having a plurality of aspherical microlenses arranged on a base;

a black matrix layer formed at an opposite surface to the certain surface of the base at which the microlenses have been formed and having an array structure of a clear aperture corresponding to the respective microlenses; and

a Fresnel's lens installed at a position facing the microlens, for applying collimated beam to the microlens array.

26. The projection screen of claim 25, wherein the aspherical microlenses have different curvature radius and conic coefficient, respectively along two orthogonal axes on the base perpendicular to an optical axis.

27. The projection screen of claim 26, wherein the aspherical microlens arrays are formed in a prolate ellipse shape of which conic coefficient takes the range between –1 and 0 (zero) along one axis of the two orthogonal axes, while the microlens is formed in an oblate spheroid shape of which conic coefficient is more than 0 (zero) along another axis orthogonal to the one axis.

28. The projection screen of claim 27, wherein the conic coefficient of the aspherical microlens is adjusted between –1 and 0 (zero) along a direction horizontal to an ground surface and adjusted greater than 0 (zero) along a direction perpendicular to the ground surface, and accordingly an angular field of view is widened in the horizontal direction and also a certain angular field of view is ensured in the perpendicular direction with preventing reduction of brightness.

29. The projection screen of claim 25, wherein the black matrix layer consists of a plurality of clear apertures formed at a circumference of an optical axis and a light cutoff portion formed of an opaque black matrix surrounding the clear apertures.

30. The projection screen of claim 25, wherein the black matrix layer is formed by a self-alignment system through the steps of:

forming a photosensitive black matrix on the other surface of the base surface on which the aspherical microlenses have been formed;

concentrating light refracted when the light passes through a curved surface of the aspherical microlenses into a circumferential area of an optical axis and exposing the area; and

removing a part of the black matrix where has been exposed and deformed through a development, thereby forming the clear apertures.

31. The projection screen of claim 25, further including an optical scattering layer bonded on a certain surface of the black matrix layer for degrading an increase of an additional angular field of view and deterioration of image quality.

32. The projection screen of claim 25, further including a supporting layer for improving stiffness and protecting components such as the microlens array from an external impact.

33. An image sensor comprising:

an image processing unit; and

an aspherical microlens arrays coupled to one side of the image processing unit and having a plurality of aspherical microlenses arranged on a base, for improving a degree of integration of light incident onto the image processing unit.

34. The image sensor of claim 33, wherein the aspherical microlens arrays have different curvature radius and conic coefficient, respectively, along two orthogonal axes on the base perpendicular to an optical layer.

35. The image sensor of claim 33, wherein the image sensor is one of an infrared imager, a bolometer array, a charge coupled device (CCD) or a complementary metal oxide semiconductor (CMOS).